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Two New Species of *Ranunculus* (*Ranunculaceae*) from Japan

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Two new species of *Ranunculus* (*Ranunculaceae*) are described from Japan. *Ranunculus hibamontanus* Kadota is described from Hiroshima Pref., western Honshu, western Japan and is distinguished from *R. japonicus* Thunb. by the receptacles sparingly villous with long, subpatent hairs, smaller petals with smaller, obtrapezoid nectary appendages, obovoidal achenes with wider keels, and medially trilobed blades of basal leaves. *Ranunculus uryuensis* Kadota is described from northern Hokkaido, northern Japan and is discriminated from *R. acris* L. subsp. *subcorymbosus* (Kom.) Toyok. f. *yuparensis* (Miyabe ex Toyok.) Toyok. by having smaller flowers arranged in a loose cyme, smaller, oblong nectary appendages adnate to nectary cups and short rhizome. *Ranunculus hibamontanus* is a basic plant and *R. uryuensis* is an ultrabasic plant.

Key words: Hiroshima, Hokkaido, Japan, nectary appendage, new species, *Ranunculus hibamontanus*, *Ranunculus uryuensis*.

Ranunculus acris L. subsp. *novus* (H. Lév. & Vaniot) Vorosch. [= *R. acris* L. var. *nipponicus* H. Hara, *R. acris* L. subsp. *subcorymbosus* Vorosch.] is a representative of Japanese alpine plants and is distributed in the area ranging Honshu (the Chubu District and northward) to Hokkaido, Japan (e.g., Toyokuni 1988, Kadota 1990, 2006, Shimizu 2002). The western limit of its range is located in the Hakusan Mountains on the border between Gifu, Ishikawa and Fukui Prefectures, central Honshu, Japan.

In 2008 I found some images of "*R. acris* subsp. *novus*" uploaded on a website. The images were said to be taken from the Hiba Mountains, Hiroshima Prefecture, western Honshu, Japan. The Hiba Mountains are distant from the Hakusan Mountains westward at least by 400 km. Then I asked Mr. Setsuo Manabe, the manager of the website, to obtain information on the plant. Mr. Manabe kindly told me the locality of the plant at issue. Subsequently I requested Dr. Masahiko Kubota to gather specimens and images of the plant in Hiroshima Prefecture. Ultimately enough material was accumulated in the Herbarium, Department of Botany, National Museum of Nature and Science, Tsukuba (TNS), due to the cooperation of Dr. Kubota and Mr. Manabe. A detailed examination of the herbarium specimens showed that the *Ranunculus* plants represent an undescribed species. This is described in this paper as *Ranunculus hibamontanus* after the locality name.

Ranunculus acris L. subsp. *subcorymbosus* (Kom.) Toyok. f. *yuparensis* (Miyabe ex Toyok.) Toyok. is described from Mt. Yûbari-dake, central Hokkaido, Japan and this is known as an ultrabasic plant (a serpentinophyte) (Toyokuni

1988, Umezawa 2009, Kadota unpubl.). In 1986 Dr. Kenji Horie discovered morphologically similar plants to *R. acris* subsp. *subcorymbosus* f. *yuparensis* in the Uryû serpentine area, northern Hokkaido. Studying the specimens sent from Dr. Horie, it turned out that the Uryû plants represent also an undescribed species. This is here described as a new species, *Ranunculus uryuensis*, after the locality name. In June 2012 field work was executed in the Uryû serpentine area and the habitat and the habit of *R. uryuensis* was observed.

Taxonomic treatment

Ranunculus L., Sp. Pl. **1**: 548 (1753).

Subgenus ***Ranunculus***: Kadota, Fl. Jpn. **IIa**: 312 (2006).

Sect. ***Acris*** Schur, Enum. Pl. Transsilv. 17 (1866): Kadota, Fl. Jpn. **IIa**: 316 (2006).

1. ***Ranunculus hibamontanus*** Kadota, sp. nov. [Figs. 1–2]

Ranunculus hibamontanus is distinguished from *R. japonicus* Thunb. by 1) receptacles sparingly villous with long, subpatent hairs (Fig. 1, F), 2) smaller petals, 3) smaller, obtrapozoid scaly appendages (Fig. 1, G), 4) obovoidal achenes with wider keels (Fig. 1, E), and 5) medially trilobed blades of basal leaves.

Ranunculus acris L. subsp. *subcorymbosus* (Kom.) Toyok. f. *yuparensis* (Miyabe ex Toyok.) Toyok., a serpentinophyte, is similar to *R. hibamontanus* in dwarf habit, however, the former is different from the latter by larger flowers, larger, fan-shaped nectary appendages, glabrous stem and petioles and deeply trilobed leaf blades.

Type: **JAPAN**. Honshu. Hiroshima Pref., Shôbara-shi, Saijô-cho, Kumano, Mt. Ikeno-dan, on olivine basalt bedrock, alt. 1270 m, 16 May 2010, fl., Masahiko Kubota s.n. (TNS 1108056–holotype, Fig. 2; TNS 11108055, 11108057–isotypes).

An erect perennial herb. Roots string-like. Stem 4–20(–25) cm tall, simple or 1–2 times branched above the middle of the stem, densely hirsute with subpatent, long hairs below and sericeous with upward, long, adpressed hairs above; collar clothed with fibrous remains of petioles. Basal leaves 2–4; blades pentagonal-reniform, 0.8–2.5 cm long, 1.2–3.7 cm wide, shallowly to deeply cordate at base, densely sericeous with adpressed hairs on both sides, shallowly trilobed; middle lobes obovato-rhombic, 0.5–1.2 cm long and wide, coarsely dentate with a few, acute and ovate teeth 2–4 mm wide; petioles 3–13 cm long, densely hirsute with subpatent, long hairs, vaginate at base. Cauline leaves deeply trilobed to ternate, similarly pubescent to the basal, shortly petioled or sessile. Flowers in May to July, solitary to 2–6 in a loose cyme, bright yellow, 1.4–1.6 cm in diameter; pedicels 3.5–6.5 cm long, densely sericeous with upward, long, adpressed hairs, sulcate; bracteoles linear, 3–5 mm long, paired, situated above the middle of the pedicels. Sepals 5, broadly ovate, 4–5 mm long, 4 mm wide, navicular, patent at anthesis, densely hirsute with long, subpatent hairs on the abaxial side. Petals 5, obovate, 6–8 mm long, 4–6 mm wide; claws 0.5 mm long; nectaries shallowly cup-shaped, less than 1 mm in diameter with obtrapozoid, scaly appendages 1.5 mm long, 1 mm wide. Anthers oblong, 1.5–2 mm long, dorsifixed and extrorse; filaments 2–3 mm long, flattened. Fruiting heads broadly ovoid to ovoid, 5–6 mm in diameter; receptacles glabrous or sometimes sparingly hirsute with long, subpatent hairs. Achenes flattened obovoidal, 2–2.5 mm long, glabrous or sometimes sparingly sparingly villous with long, ascending hairs, broadly keeled, with minute dimples on the surface; beaks 0.5 mm long, shortly hooked.

Additional specimens examined: JAPAN. Honshu. **Hiroshima** Pref., Shôbara-shi, Saijô-cho, Mt. Ikenodan, alt. 1200 m, 17 June 2009, S. Manabe s.n. (TNS 740280–740281). Shôbara-shi, Saijô-cho, Mt. Hiba-yama, alt. 1250 m, 6 July 2010, S. Manabe s.n. (TNS 1108749). Shôbara-shi, Saijô-cho, Mt. Ryû-ô-zan, on olivine basalt bedrock, alt. 1256 m, 27 May 2010, M. Kubota s.n. (TNS 1108041–1108042); Mt. Ryû-ô-zan, alt. 1230 m, 27 May 2010, M. Kubota s.n. (TNS 1108043); Mt. Ryû-ô-zan, 28 June 2012,

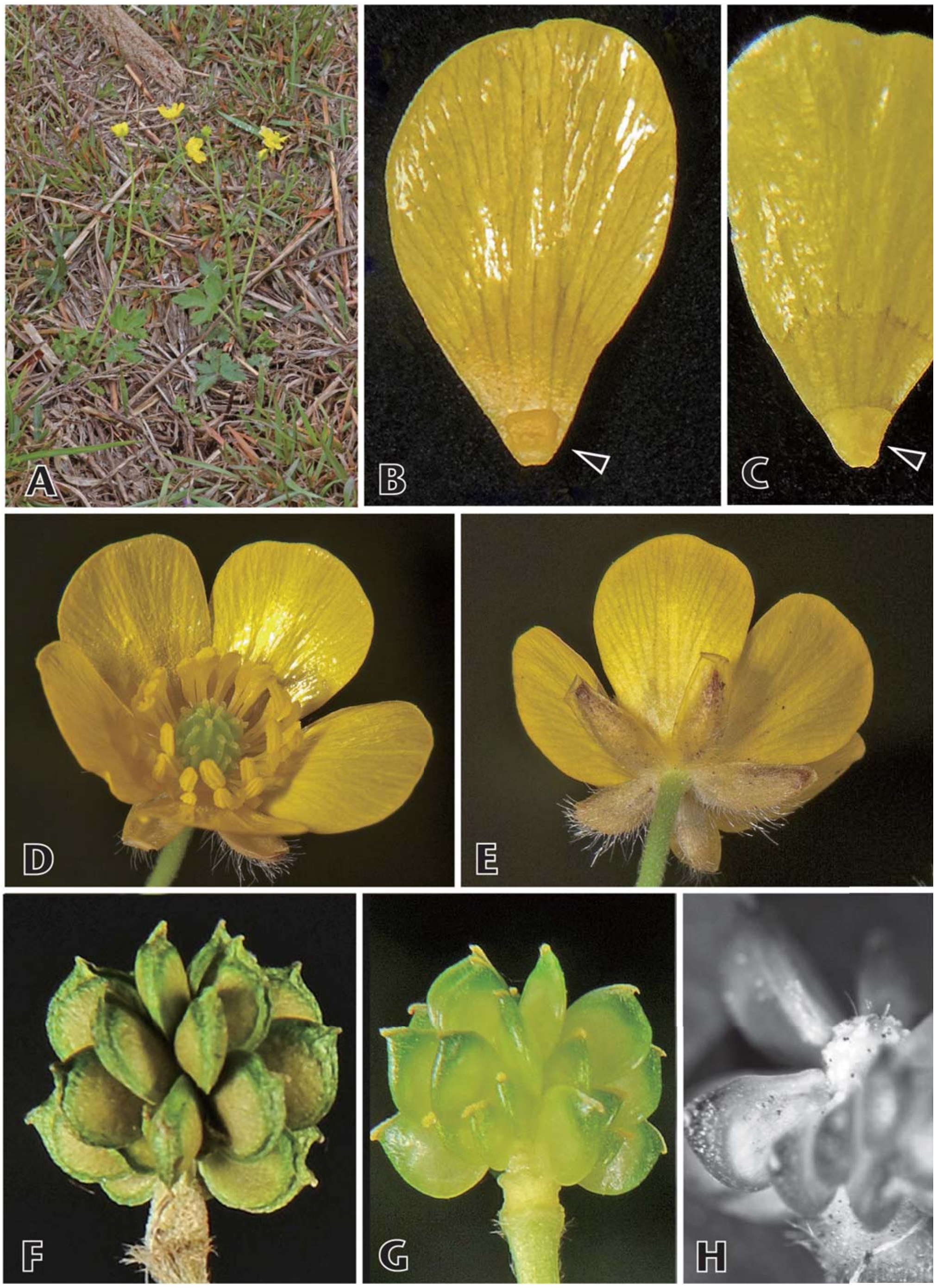
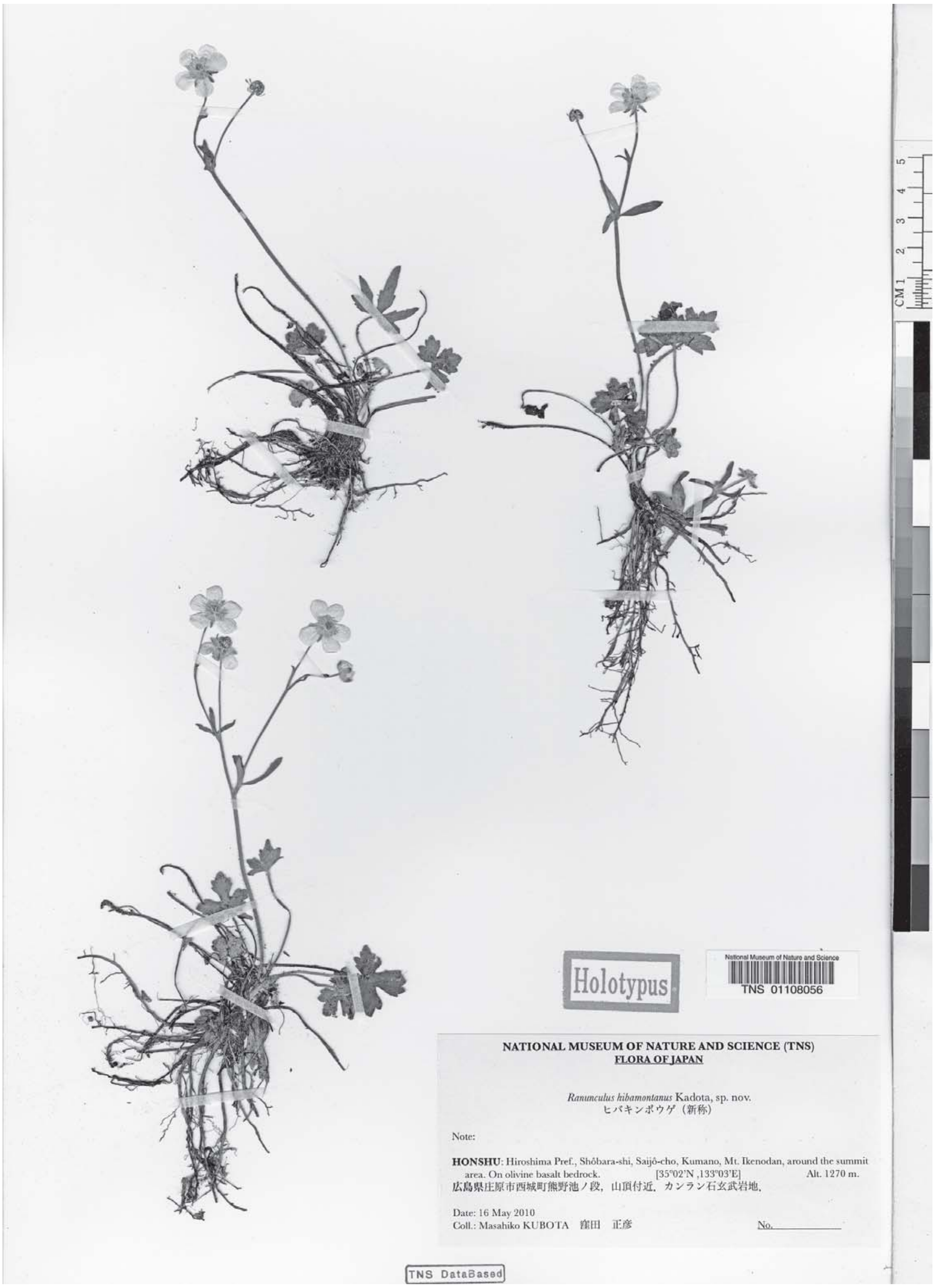


Fig. 1. *Ranunculus hibamontanus* Kadota (A–B, D–F, H; Mt. Ikeno-dan, Hiroshima Pref., Honshu, western Japan) and *R. japonicus* Thunb. (C, G). A. Habit. B. Petal of *R. hibamontanus*. C. Petal of *R. japonicus* (Tsukuba, Ibaraki Pref., Honshu, central Japan). Arrow indicates scaly nectary appendage. D. Top view of flower (*R. hibamontanus*). E. Bottom view of flower (*R. hibamontanus*). F. Fruiting head of *R. hibamontanus*. G. Fruiting head of *R. japonicus* (Kaga-shi, Isahikawa Pref., Honshu, central Japan). H. Receptacle of *R. hibamontanus* with long, subpatent hairs. Courtesy of Dr. M. Kubota for the photo A.



NATIONAL MUSEUM OF NATURE AND SCIENCE (TNS)
FLORA OF JAPAN

Ranunculus hibamontanus Kadota, sp. nov.
ヒバキンポウゲ（新称）

Note:

HONSHU: Hiroshima Pref., Shôbara-shi, Saijô-cho, Kumano, Mt. Ikenodan, around the summit area. On olivine basalt bedrock. [35°02'N ,133°03'E] Alt. 1270 m.
広島県庄原市西城町熊野池ノ段，山頂付近，カンラン石玄武岩地，

Date: 16 May 2010
Coll.: Masahiko KUBOTA 窪田 正彦
No.

Fig. 2. Type specimen of *Ranunculus hibamontanus* Kadota (JAPAN. Honshu. Hiroshima Pref., Shôbara-shi, Saijô-cho, Kumano, Mt. Ikeno-dan, alt. 1270 m, 16 May 2010, M. Kubota s.n., TNS 1108056, holotype).

M. Kubota s.n. (TNS 1165403); Mt. Ryû-ô-zan, alt. 1260 m, 11 July 2012, Y. Kadota (TNS 1165488) . Shôbara-shi, Hiwa-cho, Moriwaki, Mt. Azuma-san, on olivine bedrock, alt. ca. 1230 m, 28 May 2010, M. Kubota s.n. (TNS 1108052–1108054).

Distribution: the Hiba Mountains, northeastern part of Hiroshima Pref., western Honshu, Japan (Fig. 5, triangle). In grassland of the summit areas: 1200–1300 m in elevation. Endemic to Japan.

Japanese name: Hiba-kinpôge.

新和名：ヒバキンポウゲ

Note: *Ranunculus hibamontanus* grows in the summit areas of the Hiba Mountains where grasslands are dominant as natural vegetation. Such a kind of vegetation is typical for basic or ultrabasic areas. The summit area of Mt. Ikeno-dan, the type locality of *R. hibamontanus*, is also covered with grasses and bushes (Fig. 6, A). According to the Seamless Digital Geological Map of Japan (The Geological Society of Japan 2003–), bedrocks of the summit area of Mt. Ikeno-dan are described as "non-alkaline felsic volcanic rocks". Based on the vegetational characters bedrocks of the area may be "alkaline mafic volcanic rocks" like that of the summit area of Mt. Ryû-ô-zan just adjacent to Mt. Ikeno-dan.

2. ***Ranunculus uryuensis*** Kadota, sp. nov. [Figs. 3–4]

Ranunculus uryuensis resembles *R. acris* L. subsp. *subcorymbosus* (Kom.) Toyok. f. *yuparensis* (Miyabe ex Toyok.) Toyok. in the dwarf habit but the former is clearly discriminated from the latter by smaller flowers arranged in a loose cymb, smaller, oblong nectary appendages adnate to nectary cups (Fig. 3, E–G) and short rhizome (Fig. 3, C).

Type: **JAPAN**. Hokkaido. Kamikawa Subpref., Uryu-gun, Horokanai-cho, alt. 400 m, 22 June 1986, fl., Kenji Horie s.n. (TNS 1111764–holotype, Fig. 4; TNS 1111765–isotype).

An erect, perennial herb. Rhizome elongated, rooting at the node; roots dimorphic, slightly fusiform and string-like; internode ca. 2.5 cm long. Stem 15–20 cm tall in the flowering time, up to 35 cm tall in the fruiting time, erect to inclined, 1–2 times branched in the upper part, densely to sparingly sericeous with long, adpressed hairs; collar covered with membranous remnants of former years' petioles at the base. Basal leaves 2–5; blades reniform, 1.7–5.5 cm long, 2–4 cm wide, membranous, shallowly cordate to cordate at base, medially trilobed with ovato-lanceolate laciniae 2–4 mm wide; middle lobes obovato-rhombic, 1–3 cm long, 0.6–2 cm wide, densely to sparingly sericeous with adpressed hairs on both sides. Cauline leaves absent. Flowers in June, 2–4 in a loose cymb, bright yellow, 15–16 mm in diameter; pedicels 3–6.5 cm long, densely sericeous with golden, long, appressed hairs; bracts foliaceous, similar to the basal in shape, 2–3.5 cm long, 2–5.5 cm wide, deeply trilobed, more or less sericeous with long, adpressed hairs on both sides, sessile; bracteoles linear, 5 mm long, 0.5 mm wide in the flowering time, lanceolate and foliaceous, up to 2.8 cm long, 3 mm wide in the fruiting time. Sepals 5, ovate, ca. 6 mm long, ca. 3 mm wide, navicular, membranous along the margin, densely sericeous with adpressed hairs on the abaxial side. Petals 5–9, broadly obovate, 7–8 mm long, 5–6 mm wide; claws ca. 0.5 mm long; nectaries small cup-shaped, ca. 1 mm in diameter; scaly appendages oblong, 1 mm long, 0.5 mm wide, adnate to the nectary cups (Figs. 3, F–G). Anthers lanceolate, 1 mm long, dorsifixed and extrorse; filaments 6 mm long, flattened. Immature fruiting heads subglobose, 4 mm in diameter; receptacles glabrous. Immature achenes ovoid, flattened, 2 mm long, glabrous; beaks ca. 1 mm long, shortly recurved.

Distribution: the Uryu area, northern Hokkaido, Japan (Fig. 5, star). On moist rocky gravelly slopes or under bushes in the serpentine area: 400–460 m in elevation. Endemic to Japan.

Japanese name: Uryû-kinpôge (nom. nov.).

新和名：ウリュウキンポウゲ

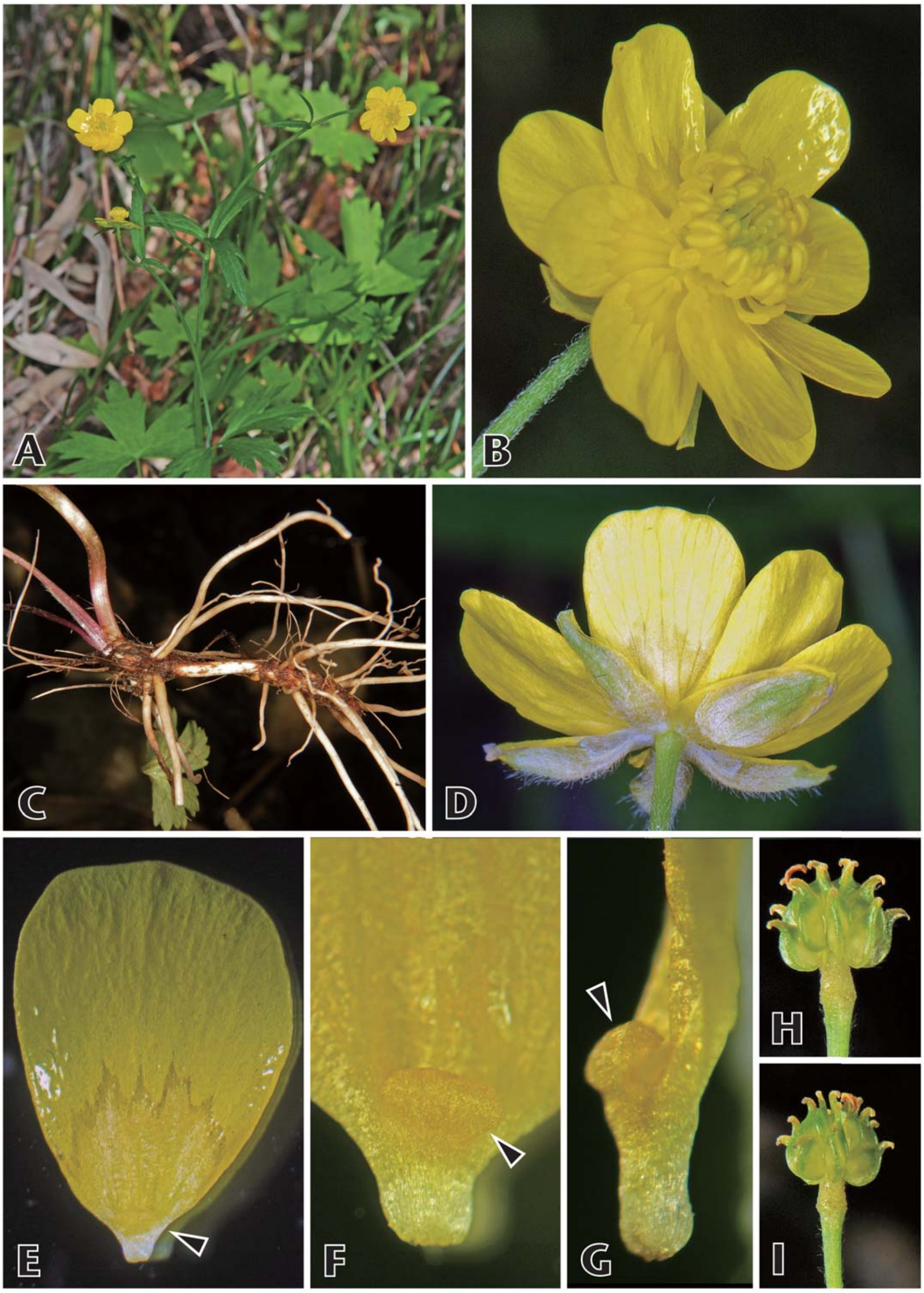
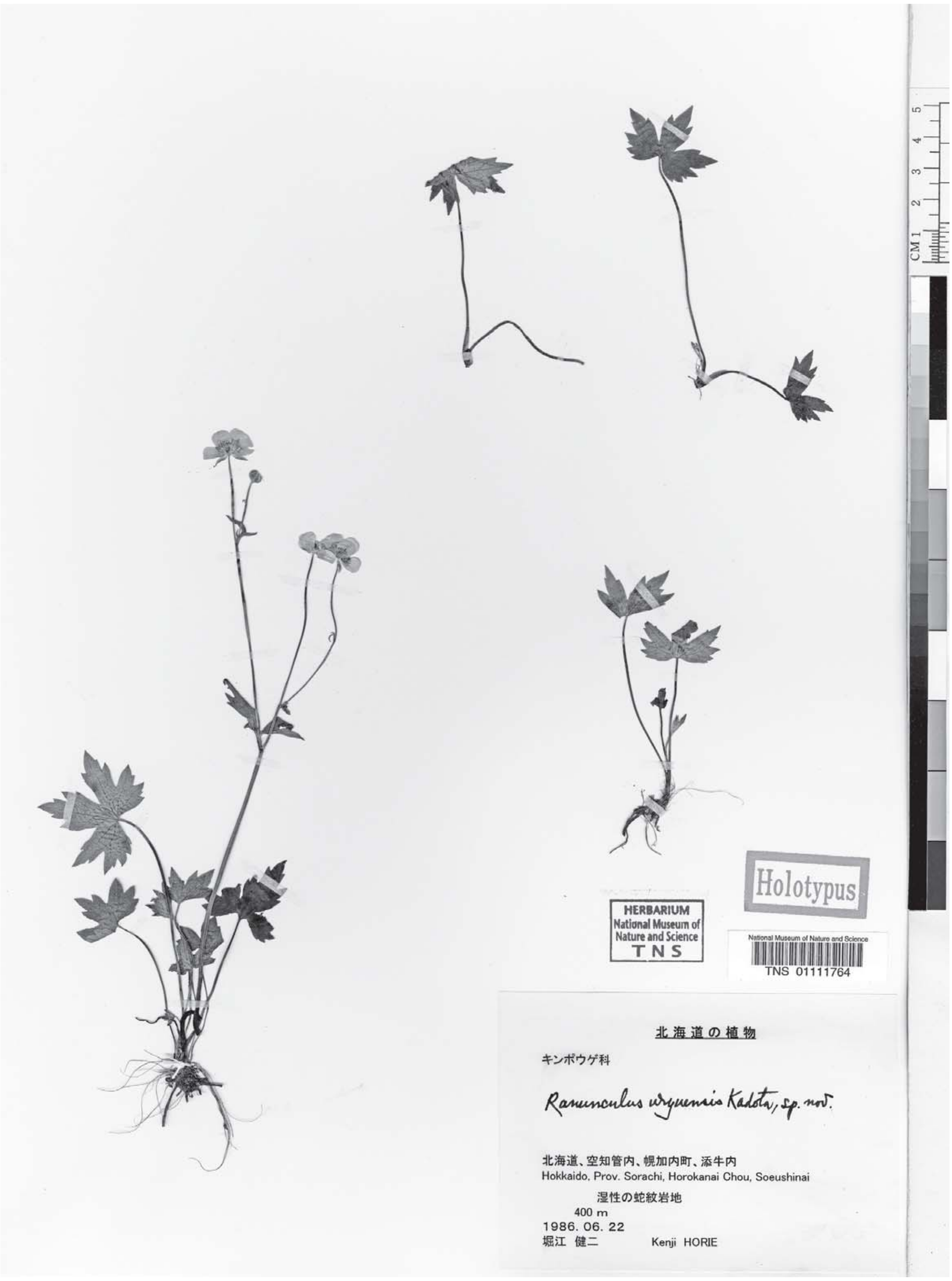


Fig. 3. *Ranunculus uryuensis* Kadota (Horokanai-cho, Uryu-gun, Kamikawa Subpref., Hokkaido, northern Japan). A. Habit. B. Top view of flower (double). C. Subterranean organ showing long internode. D. Bottom view of flower. E. Petal. F–G. Nectary. F. Ventral view. G. Lateral view. Arrow indicates scaly nectary appendage. H–I. Immature fruiting heads. Courtesy of Dr. K. Horie for photos A–B, D–G.


CM 1
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Holotypus
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National Museum of
Nature and Science
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National Museum of Nature and Science
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北海道の植物
キンポウゲ科
Ranunculus uryuensis Kadota, sp. nov.
北海道、空知管内、幌加内町、添牛内
Hokkaido, Prov. Sorachi, Horokanai Chou, Soeushinai
湿性の蛇紋岩地
400 m
1986. 06. 22
堀江 健二
Kenji HORIE

Fig. 4. Type specimen of *Ranunculus uryuensis* Kadota (JAPAN. Hokkaido. Kamikawa Subpref., Uryu-gun, Horokanai-cho, alt. 400 m, 22 June 1986, fl., K. Horie s.n., TNS 1111764, holotype).

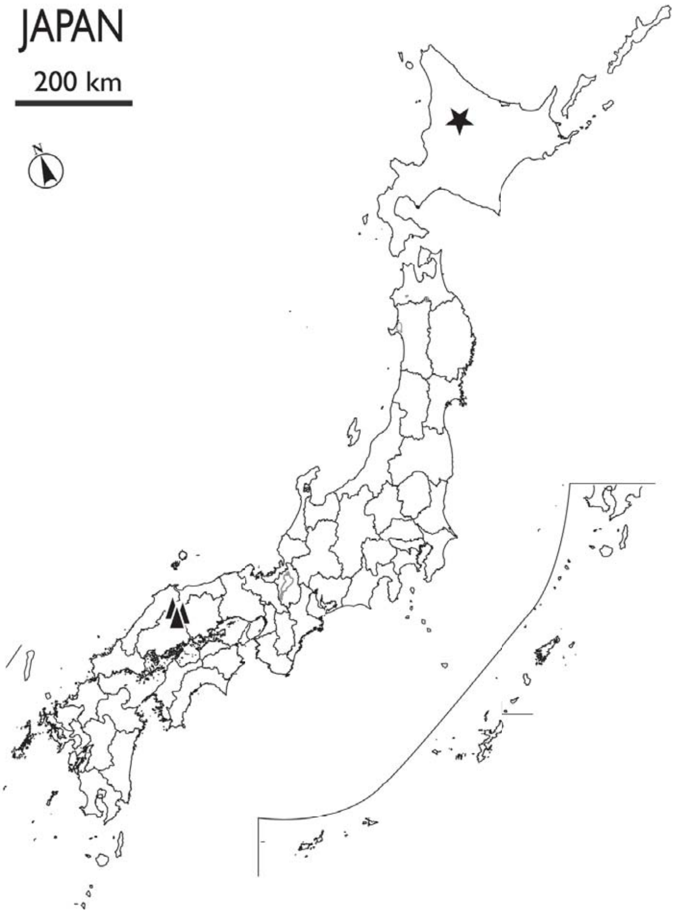

Fig. 5. Distribution of *Ranunculus hibamontanus* (triangle) and *R. uryuensis* (star).

Additional specimen examined: JAPAN. Hokkaido: **Kamikawa** Subpref., Uryu-gun, Horokanai-cho, alt. 463 m, 27 June 2012, fl., Y. Kadota s.n. (TNS 1163056).

Note: *Ranunculus uryuensis* is unique in having a horizontal rhizome. No species possess such rhizome except for *R. uryuensis* in Japan (Kadota 1990, 2006). *Ranunculus uryuensis* is similar to *R. cuneifolius* Maxim. from NE China in having a horizontal rhizome (Wang 1978, Li et al. 2006).

Ranunculus franchetii H. Boisseu commonly occurs also in northern Hokkaido but differs clearly from *R. uryuensis* by the absence of nectary appendages, larger flowers, and achenes densely pubescent with short, patent hairs.

According to Dr. K. Horie (pers. comm.) two populations of *R. uryuensis* were found in the Uryu area at the time of finding. One of the populations was extinct due to landslide because serpentine areas are topographically unstable in general (Fig. 6, B). Currently a single population of this species has been recognized in the area and the population has been estimated to be composed of less than fifty individuals (June 2012). *Ranunculus uryuensis* should be therefore treated as an endangered endemic of Japan.

I wish to show my cordial thanks to Mr. Setsuo Manabe, Hiroshima, and to Dr. Masahiko Kubota, Hiroshima, for their presents

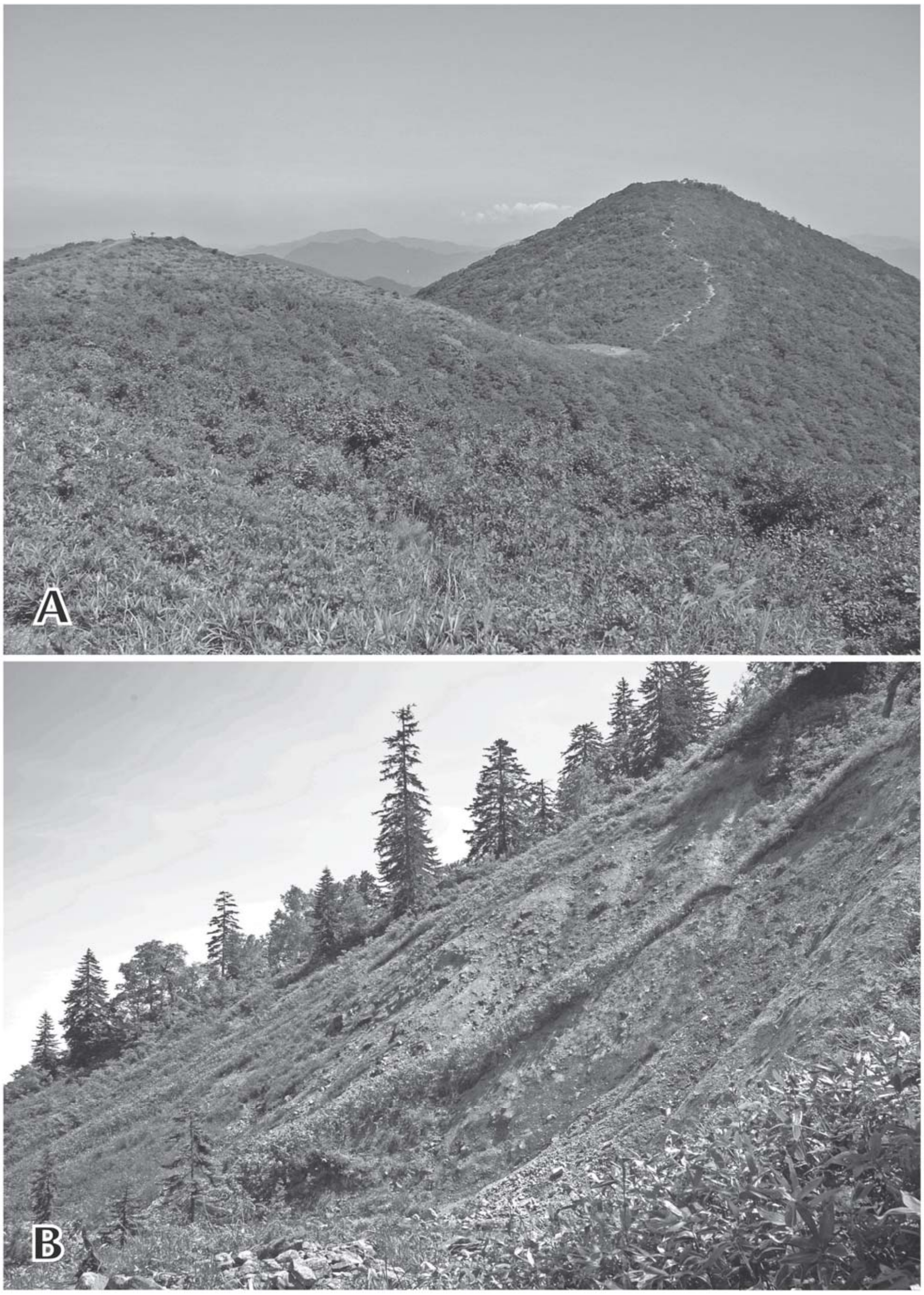

Fig. 6. Habitats of *Ranunculus hibamontanus* (A) and *R. uryuensis* (B). A. Mt. Ikeno-dan, Hiroshima Pref., Honshu, western Japan, showing the basic area without forest vegetation. Courtesy of Mr. S. Manabe. B. Serpentine (ultrabasic) slope, Horokanai-cho, Hokkaido, northern Japan.

of herbarium specimens, living material and valuable information on *Ranunculus hibamontanus*; to Dr. Kenji Horie, Asahikawa, for his present of herbarium specimens, images of *Ranunculus uryuensis* and guidance to the localities of this new species.

References

Kadota Y. 1990. Taxonomic notes on the alpine species of *Ranunculus* in Japan. Bull. Natn. Sci. Mus., Tokyo, Ser. B, **16**(2): 73–92.

Kadota Y. 2006. *Ranunculus*. *In*: Iwatsuki K., Boufford D. E. and Ohba H. (eds.), Flora of Japan **IIa**: 310–322. Kodansha, Tokyo.

Kadota Y. 2007. A new species of *Ranunculus* (*Ranunculaceae*) from Hokkaido, northern Japan. J. Jpn. Bot. **82**(6): 321–327.

Shimizu T. 2002. Alpine Flowers of Japan. 495 pp. Yama-kei Publishers Co., Tokyo (in Japanese).

The Geological Society of Japan, AIST 2003– Seamless Digital Geological Map of Japan (http://riodb02.ibase.aist.go.jp/db084/zoomify_en.html).

Toyokuni H. 1988. Alpine Flowers of Japan. 719 pp. Yama-kei Publishers Co., Tokyo (in Japanese).

Umezawa S. 2009. Alpine Flowers of Hokkaido. 367 pp. The Hokkaido Shimbun Press, Sapporo (in Japanese).

門田裕一：**日本産キンポウゲ属（キンポウゲ科）の2新種**

日本産キンポウゲ属（キンポウゲ科）の2新種を記載した．広島県からのヒバキンポウゲ *Ranunculus hibamontanus* Kadotaと北海道道北地方からのウリュウキンポウゲ *R. uryuensis* Kadotaの2種である．

ヒバキンポウゲはウマノアシガタ *R. japonicus* Thunb. に似るが，全体が小型で，①果托に長毛があり，②花弁がより小型で，③花弁の付属体が小型で倒台形であり，④痩果が倒卵形で竜骨が明瞭で幅広く，⑤根生葉の葉身が中裂することで区別される．また，ミヤマキンポウゲ *R. acris* L. subsp. *novus* (H. Lév. & Vaniot) Vorosch. [= *R. acris* L. var. *nipponicus* H. Hara, *R. acris* L. subsp. *subcorymbosus* Vorosch.] の蛇紋岩矮小型であるコミヤマキンポウゲ f. *yuparensis* (Miyabe ex Toyok.) Toyok. は北海道夕張岳の固有植物で，茎や葉柄が無毛で，葉身が深裂し，花が大型で，花弁の付属体が扇形でより大型であることでヒバキンポウゲと区別される．ヒバキンポウゲは広島県北東部に分布し，塩基性岩地の山地草原に生育する．

ウリュウキンポウゲは植物体が小型である点でやはりコミヤマキンポウゲに似るが，①花がより小型で疎らな散房花序に少数個付くこと（単生しない），②花弁蜜腺の付属体が楕円形かつ小型で，杯状の蜜腺と癒合すること，③短いながらも地下茎が伸びることなどで明瞭に区別される．ウリュウキンポウゲは北海道道北地方の湿性蛇紋岩崩壊地とその周辺に生育する．

（国立科学博物館植物研究部）